

Remarks

In response to the Office Action mailed June 25, 2004, the Applicants respectfully request reconsideration of the pending claims based on the above amendments and the following remarks. The pending claims are believed to be in allowable condition.

As noted above, paragraphs 42, 45, 61, 64, 65, 66 and claims 1, 2, 5, 7, 8, 9, 11, 12, 15, 17, 18, 19, 21, 22, 25, 27, and 28 in the Specification have been amended. In addition, claims 30-32 have been added. Paragraphs 42, 45, 61, 64, 65, and 66 have been amended to correct typographical errors noted by the Examiner in the Office Action of June 25, 2004. No new matter has been added by these amendments.

Claims 1, 11, and 21 have been amended to clarify that the method, system, and computer-readable medium for reservoir targeting includes filtering a plurality of values characterizing a reservoir in a three-dimensional model. Support for these amendments may be found in paragraph 32 on pages 10-11 of the Specification. No new matter has been added by these amendments. Claim 11 has further been amended to specify that the recited computer-readable medium includes computer-executable instructions which are executed on a computer. Support for this amendment may be found in Figure 1 and paragraphs 24-28 on pages 7-9 of the Specification. No new matter has been added by this amendment.

Claims 2, 12, and 22 have been amended to clarify that the value of interest comprises a multiple of the radius of each of the selected target locations. Support for this amendment may be found in paragraph 52 on page 17 of the Specification. No new matter has been added by these amendments.

Claims 9 and 19 have been amended to clarify that selecting target locations comprises ranking the selected target locations and displaying a user-selected percentage of the ranked target locations. Support for these amendments may be found in paragraph 55 on page 18 of the Specification. No new matter has been added by these amendments.

Claims 5, 7, 8, 15, 17, 18, 25, 27, and 28 have been amended to correct typographical errors noted by the Examiner and undersigned counsel for the Applicants. The amendments include changing the spelling of the term "CuWeight" to "CumWeight," changing the term "DistanceFrom Cell" to "DistanceFromCell," and changing the term "predetermine" to "predetermined." No new matter has been added by these amendments.

New claims 28-30 have been added that "a cumulative value" comprises at least one accumulated value. Support for these amendments may be found in paragraph 39 on page 13 and in paragraphs 41-46 on pages 14-15 of the Specification. In addition, those skilled in the art will appreciate that the term "cumulative" may be defined as a "made up of accumulated values." No new matter has been added by these amendments.

Claims 1-29 are currently pending in the application. The Drawings, the disclosure in the Specification, and Claims 5, 7, 8, 15, 17, 18, 25, 27, and 28 are objected to because of various informalities. Claims 1-29 stand rejected under 35 U.S.C. § 112, second paragraph. Claims 11-20 stand rejected under 35 U.S.C. § 101. Claims 1, 4-9, 11, 14-19, 21, 24-28 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Cullick et al. (U.S. Patent 6,549,879, hereinafter "Cullick"). Claims 2, 3, 12, 13, 22, and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cullick in view of Bush (U.S. Patent Application 2003/0204311). It is

noted for the record that U.S. Patent Application 2003/0201311 (Lindley) was mailed with the Office Action instead of Bush. Claims 10, 20, and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cullick in view of Kocerber (U.S. Patent 5,740,342).

Drawings

The Examiner's objection to the drawings as explained in Form PTO-948 is noted. In response, Applicants will submit corrected drawings prior to issuance of the instant patent application.

Specification

The disclosure is objected to because of various informalities in paragraphs 42, 45, 6, 64, 65, and 66. As noted above in the section entitled "Amendments to the Specification," these informalities have been corrected in conformity with the Examiner's suggestions. Accordingly, the Examiner's objection to the disclosure should be withdrawn.

Claim Objections

Claims 5, 7, 8, 15, 18, 25, 27, and 28 are objected to because of various informalities. As noted above in the section entitled "Amendments to the Claims," these informalities have been corrected in conformance with the Examiner's suggestions.

Claim Rejections—35 U.S.C. §112, second paragraph

Claims 1-29 stand rejected as being indefinite. Specifically, claims 1, 2, 9, 11, 12, 19, 21, and 22 were identified as being indefinite. Regarding claims 1, 11, and 21, these claims have been amended to clarify that the plurality of values are characteristic of a reservoir. For instance, Figures 2 and 3 show an illustrative three-dimensional model representing the distribution of the values characterizing a reservoir (i.e., porosity and oil saturation values). In other illustrative embodiments of the invention the three-dimensional model may be triangulated to create a three dimensional grid of cells which may be filtered based on values characterizing a reservoir (as

shown, for example, in Figure 4). Regarding claims 2, 12, and 22, these claims have been amended to clarify that a “value of interest” comprises a multiple of the radius of each of the selected target locations. Regarding claims 9 and 19, these claims have been amended to clarify that selecting target locations comprises ranking the selected target locations and displaying a user-selected percentage of the ranked target locations. Based on the aforementioned amendments and discussion, it is respectfully submitted that the rejections of claims 1, 2, 9, 11, 12, 19, 21, and 22 under 35 U.S.C. §112, second paragraph should be withdrawn.

Claim Interpretations

The Examiner’s interpretations of claims 5, 15, and 25 is accepted as evidenced in the amendments of these claims (see above).

Claim Rejections—35 U.S.C. §101

Claims 11-20 stand rejected for claiming non-statutory subject matter. As noted above in the section entitled “Amendments to the Claims,” claims 11-20 have been amended in conformity with the Examiner’s suggestions. Accordingly, the Examiner’s rejections of claims 11-20 should be withdrawn.

Claim Rejections—35 U.S.C. §102

Claims 1, 4-9, 11, 14-19, 21, and 24-28 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Cullick. Amended independent claim 1 specifies a method of reservoir targeting. The method includes filtering a plurality values characterizing a reservoir in a three-dimensional model to eliminate values which are below a threshold to create a filtered three-dimensional model, developing a first matrix from the filtered three-dimensional model representing a two-

dimensional model of the reservoir, wherein the first matrix includes a plurality of cell center locations, cell areas, and the plurality of values, developing a second matrix from the first matrix using a distance-weighted sum of the plurality of values, and selecting target locations from the second matrix based on the distance-weighted sum of the plurality of values.

Cullick discloses a two-stage method for determining well locations in a 3D reservoir model. The first stage includes determining well locations for vertical wells while the second stage includes determining well location for horizontal or deviated wells. In the first stage, a 3D-reservoir quality volume is used to generate a 2D quality map. Each cell in the 2D array may be considered as a potential site where a well can be drilled. The method includes selecting a subset of the potential locations that will maximize the cumulative value of reservoir property locations while ensuring that the planar distance between the selected sites is over a certain specified minimum to avert well interference. The second stage includes determining well trajectories that connect maximum reservoir pay values while honoring configuration constraints. In both stages, the method includes optimizing a static measure based on a proxy value such as porosity, net pay, permeability, permeability-thickness, or pore volume. See Col. 3, lines 47-67 through Col. 4, lines 1-12 and Col. 9, lines 4-59.

Cullick, however, fails to teach, disclose, or suggest the filtering of values characterizing a reservoir and the development of a second matrix from a previously developed first matrix including a plurality of cell center locations, cell areas, and the plurality of values, where the second matrix uses a distance-weighted sum of the plurality of values from the first matrix. Cullick further fails to teach, disclose, or suggest selecting target locations from the second

matrix based on the distance-weighted sum. In response to the Office Action, it is respectfully submitted that Cullick does not disclose multiple matrices, in which one matrix uses the results of another matrix, based on a distance-weighted sum, as alleged. Therefore, in view of the foregoing, amended independent claim 1 is allowable over Cullick and the rejection of claim 1 should be withdrawn.

Claims 4-9 depend from amended independent claim 1 and thus are allowable for at least the reasons stated above with respect to claim 1 as well as the additional features set forth therein. For example, dependent claim 5 specifies that developing the second matrix further comprises deriving a cumulative value associated with each center location using the relationship: $\text{cumulative value} = (\text{CumWeightedValue} / \text{CumWeightedArea}) * \text{CumWeightedArea}$, wherein

$$\text{CumWeightedValue} = \sum \text{cellvalue} * \text{weight},$$

$$\text{CumWeightedArea} = \sum \text{cellarea} * \text{weight}, \text{ and}$$

$\text{CumWeight} = \sum (\text{SpacingRadius} - \text{DistanceFromCell}) / \text{SpacingRadius}$, where SpacingRadius is a user-defined value and DistanceFromCell is defined as one of the larger of an actual distance from a cell under consideration to an adjacent cell and half the diagonal cell width; and dependent claim 9 specifies that selecting target locations further comprises ranking the selected target locations and displaying a user-selected percentage of the ranked target locations. Based on the discussion above Cullick fails to teach, suggest, or disclose the aforementioned features. Accordingly, the rejections of dependent claims 4-9 should also be withdrawn.

Amended independent claims 11 and 21 specify similar features as amended independent claim 1, discussed above. As discussed above, Cullick fails to teach, disclose, or suggest each of the features specified in amended independent claim 1. Therefore, in view of the foregoing, amended independent claims 11 and 21 are allowable over Cullick and the rejections of these claims should be withdrawn. Claims 14-19 and 24-28 depend from amended independent claims 11 and 21, respectively, and thus are allowable for at least the reasons stated above with respect to claims 11 and 21 as well as the additional features set forth therein. Accordingly, the rejections of dependent claims 14-19 and 24-28 should also be withdrawn.

Claim Rejections—35 U.S.C. §103

Claims 2, 3, 12, 13, 22, and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cullick in view of Bush. Claims 2-3, 12-13, and 22-23 depend from amended independent claims 1, 11, and 21, respectively and thus include the same features as these claims as well as the additional features recited therein. In particular, claims 2, 12, and 22 specify developing the first matrix by windowing one or more cells from the filtered three-dimensional model to determine a center point location with a value of interest, wherein the value of interest comprises a multiple of the radius of each of the selected target locations while claims 3, 13, and 23 specify determining the windowing of the one or more cells based on the number of layers in the filtered three-dimensional model of the reservoir.

As discussed above, Cullick fails to teach, disclose, or suggest the features specified in claims 2-3, 12-13, and 22-23. Bush, relied upon to cure the deficiencies of Cullick, discloses a method for the automated delineation of hydrocarbon accumulations from seismic data. The

method includes developing a neural network using data indicating productive areas and data indicating nonproductive areas and applying the neural network to at least a portion of the data to distinguish producing areas from non-producing areas (Par. 39). Bush, however, fails to teach, disclose, or suggest the filtering of values characterizing a reservoir and the development of a second matrix from a previously developed first matrix including a plurality of cell center locations, cell areas, and the plurality of values, where the second matrix uses a distance-weighted sum of the plurality of values from the first matrix. Bush further fails to teach, disclose, or suggest selecting target locations from the second matrix based on the distance-weighted sum. Bush further fails to teach, disclose, or suggest a value of interest comprising a multiple of the radius of each of the selected target locations. Based on the foregoing, neither Cullick nor Bush, alone or in combination, teaches, discloses, or suggests each of the features specified in claims 2, 3, 12, 13, 22, and 23. Accordingly, the rejections of these claims should be withdrawn.

Claims 10, 20, and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cullick in view of Kocerber. Claims 10, 20, and 29 depend from amended independent claims 1, 11, and 21, respectively and thus include the same features as these claims as well as the additional features recited therein. Kocerber discloses a method of generating a three-dimensional hybrid grid for geological formations with a sloping fault (Col. 2, lines 13-20). Kocerber, however, fails to teach, disclose, or suggest the filtering of values characterizing a reservoir and the development of a second matrix from a previously developed first matrix including a plurality of cell center locations, cell areas, and the plurality of values, where the

second matrix uses a distance-weighted sum of the plurality of values from the first matrix. Kocberber further fails to teach, disclose, or suggest selecting target locations from the second matrix based on the distance-weighted sum. Based on the foregoing, neither Cullick nor Kocberber, alone or in combination, teaches, discloses, or suggests each of the features specified in claims 10, 20, and 29. Accordingly, the rejections of these claims should be withdrawn.

New Claims

New claims 28, 29, and 30 depend from depend from amended independent claims 1, 11, and 21, respectively, and thus are allowable for at least the reasons stated above with respect to these claims 11 and 21 as well as the additional features set forth therein. Accordingly, it is respectfully submitted that claims 28-30 are in condition for allowance.

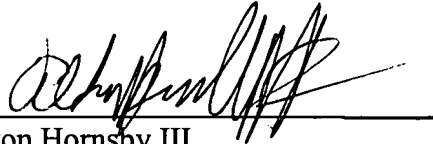
Conclusion

In view of the foregoing amendments and remarks, this application is now believed to be in a condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is invited to call directly Applicants' attorney at the number listed below.

If any additional fees are required for the timely consideration of this application, please charge Deposit Account Number 13-2725.

Respectfully submitted,

MERCHANT & GOULD



Alton Hornsby III
Reg. No. 47,299

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Merchant & Gould, LLC
P.O. Box 2903
Minneapolis, Minnesota 55402-0903
Telephone: 404.954.5100

